

What is claimed is:

1 1. A method for adjusting an optical axis having n
2 oblique vector (X_p , Y_p) of an optical disc drive, wherein
3 the optical disc drive includes a guide bar for moving
4 the optical pickup, the method comprising:

5 providing a laser collimator, a first reflecting
6 member, a second reflecting member and a third
7 reflecting member;

8 disposing the first reflecting member on a turntable
9 of the optical disc drive;

10 rotating the turntable and the first reflecting
11 member disposed on the turntable;

12 emitting a laser light on the first reflecting
13 member by the laser collimator;

14 measuring a normal vector (X_{TT} , Y_{TT}) of the turntable
15 based on a light point reflected to the
16 collimator from the first reflecting member;

17 disposing the second reflecting member on the guide
18 bar of the optical disc drive at a first
19 position, and emitting a laser light on the
20 second reflecting member by the laser
21 collimator;

22 measuring a first initial vector (X_{1s} , Y_{1s}) based on a
23 light point reflected to the laser collimator
24 from the second reflecting member;

25 disposing the third reflecting member on the guide
26 bar of the optical disc drive at a second
27 position;

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28 emitting a laser light on the third reflecting
29 member by the laser collimator;
30 measuring a second initial vector (X_{2s} , Y_{2s}) based on
31 a light point reflected to the collimator from
32 the third reflecting member; and
33 adjusting the guide bar based on the oblique vector
34 (X_p , Y_p), the normal vector (X_{TT} , Y_{TT}), the first
35 initial vector (X_{1s} , Y_{1s}), and the second initial
36 vector (X_{2s} , Y_{2s}) so that the optical axis of the
37 optical pickup is parallel to the normal vector
38 of the turntable.

1 2. The method as claimed in claim 1, wherein a
2 circular trace is formed by the light point reflected to
3 the laser collimator from the first reflecting member,
4 and the normal vector of the turntable is calculated
5 based on a center of the circular trace.

1 3. The method as claimed in claim 1, wherein the
2 guide bar includes a first bar and a second bar, and the
3 second reflecting member is in contact with the first bar
4 at a first point and a second point and is in contact
5 with the second bar at a third point when the second
6 reflecting member is disposed on the guide bar, and the
7 third reflecting member is in contact with the first bar
8 at the first point and the second point and is in contact
9 with the second bar at a fourth point when the third
10 reflecting member is disposed on the guide bar.

1 4. The method as claimed in claim 3, further
2 comprising:

3 adjusting the first bar to be parallel to the second
4 bar so that the optical axis of the optical
5 pickup is parallel with the normal vector of
6 the turntable when adjusting the guide bar.

1 5. The method as claimed in claim 4, wherein the
2 optical disc drive includes a first adjusting screw, a
3 second adjusting screw, and a third adjusting screw, and
4 the first adjusting screw is used for adjusting the first
5 bar, and the second adjusting screw and the third
6 adjusting screw are used for adjusting the second bar,
7 and the first bar is made parallel to the second bar by
8 adjusting the first adjusting screw, the second adjusting
9 screw, and the third adjusting screw when adjusting the
10 guide bar.

1 6. The method as claimed in claim 5, wherein a
2 distance between the first point and the second point is
3 L_1 , and the first adjusting screw is adjusted by $(X_{2S} - X_{TT} + X_p) L_1$.

1 7. The method as claimed in claim 6, wherein a
2 first vector from the first point to the third point is
3 $(L_{2I}, -L_3)$, and a second vector from the first point to the
4 fourth point is $(L_{20}, -L_3)$, and a distance between the
5 third point and the second adjusting screw is L_{10} , and a
6 distance between the fourth point and the third adjusting
7 screw is L_{00} , and the second adjusting screw is adjusted
8 by $(X_{1S} - X_{TT} + X_p) L_{2I} + (Y_{TT} - Y_p - Y_{1S}) L_3 - [(X_{2S} - X_{TT} + X_p) L_{20} + (Y_{TT} - Y_p - Y_{2S}) L_3 - (X_{1S} - X_{TT} + X_p) L_{2I} - (Y_{TT} - Y_p - Y_{1S}) L_3] L_{10} / (L_{20} - L_{2I})$, and the third
9 adjusting screw is adjusted by $(X_{2S} - X_{TT} + X_p) L_{20} + (Y_{TT} - Y_p - Y_{2S}) L_3 - (X_{1S} - X_{TT} + X_p) L_{2I} - (Y_{TT} - Y_p - Y_{1S}) L_3] L_{10} / (L_{20} - L_{2I})$, and the third
10 adjusting screw is adjusted by $(X_{2S} - X_{TT} + X_p) L_{20} + (Y_{TT} - Y_p - Y_{2S}) L_3 - (X_{1S} - X_{TT} + X_p) L_{2I} - (Y_{TT} - Y_p - Y_{1S}) L_3] L_{10} / (L_{20} - L_{2I})$,

11 $Y_{2S}) L_3 + [(X_{2S} - X_{TT} + X_p) L_{20} + (Y_{TT} - Y_p - Y_{2S}) L_3 - (X_{1S} - X_{TT} + X_p) L_{21} - (Y_{TT} - Y_p - Y_{1S}) L_3] L_{00} / (L_{20} - L_{21})$.

1 8. A method for adjusting an optical axis of an
2 optical disc drive, comprising:

3 providing an oblique vector (X_p, Y_p) of an optical
4 axis of an optical pickup of the optical disc
5 drive, a laser collimator, a first reflecting
6 member, a second reflecting member, and a third
7 reflecting member, wherein the optical disc
8 drive includes a first bar and a second bar for
9 moving the optical pickup;

10 disposing the first reflecting member on a turntable
11 of the optical disc drive;

12 rotating the turntable and the first reflecting
13 member disposed on the turntable, and emitting
14 a laser light on the first reflecting member by
15 the laser collimator, and measuring a first
16 initial vector (X_{TT}, Y_{TT}) based on a light point
17 reflected to the laser collimator from the
18 first reflecting member;

19 disposing the second reflecting member on the first
20 bar and the second bar in a manner such that
21 the second reflecting member is in contact with
22 the first bar at a first point and a second
23 point and is in contact with the second bar at
24 a third point, and emitting a laser light on
25 the second reflecting member by the laser
26 collimator, and measuring a first initial
27 vector (X_{1S}, Y_{1S}) based on a light point

28 reflected to the laser collimator from the
29 second reflecting member;
30 disposing the third reflecting member on the first
31 bar and the second bar in a manner such that
32 the third reflecting member is in contact with
33 the first bar at the first point and the second
34 point and is in contact with the second bar at
35 a fourth point, and emitting a laser light on
36 the third reflecting member by the laser
37 collimator, and measuring a second initial
38 vector (X_{2s} , Y_{2s}) based on a light point
39 reflected to the laser collimator from the
40 third reflecting member; and
41 adjusting the first bar to be parallel with the
42 second bar based on the oblique vector (X_p , Y_p),
43 the normal vector (X_{TT} , Y_{TT}), the first initial
44 vector (X_{1s} , Y_{1s}), and the second initial vector
45 (X_{2s} , Y_{2s}) so that the optical axis of the
46 optical pickup is parallel with the normal
47 vector of the turntable.

1 9. The method as claimed in claim 8, wherein a
2 circular trace is formed by the light point reflected to
3 the laser collimator from the first reflecting member,
4 and the normal vector of the turntable is calculated
5 based on a center of the circular trace.

1 10. The method as claimed in claim 8, wherein the
2 optical disc drive includes a first adjusting screw, a
3 second adjusting screw, and a third adjusting screw, and
4 the first adjusting screw is used for adjusting the first

5 bar, and the second adjusting screw and the third
6 adjusting screw are used for adjusting the second bar,
7 and the first bar is parallel to the second bar by
8 adjusting the first adjusting screw, the second adjusting
9 screw, and the third adjusting screw when adjusting the
10 first bar and the second bar.

1 11. The method as claimed in claim 10, wherein a
2 distance between the first point and the second point is
3 L_1 , and the first adjusting screw is adjusted by $(X_{2S} - X_{TT} + X_p) L_1$.
4

1 12. The method as claimed in claim 11, wherein a
2 first vector from the first point to the third point is
3 $(L_{2I}, -L_3)$, and a second vector from the first point to the
4 fourth point is $(L_{2O}, -L_3)$, and a distance between the
5 third point and the second adjusting screw is L_{IO} , and a
6 distance between the fourth point and the third adjusting
7 screw is L_{OO} , and the second adjusting screw is adjusted
8 by $(X_{1S} - X_{TT} + X_p) L_{2I} + (Y_{TT} - Y_p - Y_{1S}) L_3 - [(X_{2S} - X_{TT} + X_p) L_{2O} + (Y_{TT} - Y_p - Y_{2S}) L_3 -$
9 $(X_{1S} - X_{TT} + X_p) L_{2I} - (Y_{TT} - Y_p - Y_{1S}) L_3] L_{IO} / (L_{2O} - L_{2I})$, and the third
10 adjusting screw is adjusted by $(X_{2S} - X_{TT} + X_p) L_{2O} + (Y_{TT} - Y_p -$
11 $Y_{2S}) L_3 + [(X_{2S} - X_{TT} + X_p) L_{2O} + (Y_{TT} - Y_p - Y_{2S}) L_3 - (X_{1S} - X_{TT} + X_p) L_{2I} - (Y_{TT} - Y_p -$
12 $Y_{1S}) L_3] L_{OO} / (L_{2O} - L_{2I})$.

1 13. A device for adjusting an optical axis of an
2 optical disc drive, comprising:

3 a plurality of reflecting members disposed on the
4 optical disc drive; and
5 a laser collimator for emitting a laser light on the
6 reflecting members and measuring a normal

7 vector of a base of the optical disc drive and
8 a normal vector of a turntable of the optical
9 disc drive.

1 14. The device as claimed in claim 13, further
2 comprising:

3 an adjusting unit for adjustment of adjusting screws
4 of the optical disc drive so that a first bar
5 of the optical disc drive is parallel to a
6 second bar of the optical disc drive and an
7 optical axis of an optical pickup of the
8 optical disc drive is parallel to the normal
9 vector of the turntable.

1 15. The device as claimed in claim 13, wherein a
2 surface, facing the laser collimator, of each of the
3 reflecting members is made of reflective material.

1 16. The device as claimed in claim 13, wherein the
2 laser collimator includes an image pickup for obtaining a
3 light point reflected back to the laser collimator from
4 the reflecting members to form images.

1 17. The device as claimed in claim 13, further
2 comprising:

3 a beam splitter, disposed between the laser
4 collimator and the reflecting members, for
5 guiding the laser light emitted from the laser
6 collimator to a predetermined position on each
7 of the reflecting members.